MACKAY FISH HATCHERY

ANNUAL REPORT

January 1, 1991 - December 31, 1991

Prepared By:

Bill Doerr, Fish Hatchery Superintendent II
Doug Engemann, Fish Hatchery Superintendent I
Robert Hoover, Fish Culturist

INTRODUCTION

The Mackay Hatchery is a specialty fish production station, located approximately 12 miles north of the town of Mackay in Custer County, Idaho. The hatchery produces salmonids of various species and strains, from 1 to 14 inches in length, for statewide distribution. Funding for operational costs is obtained, under contract, from Wallop-Breaux funds. A schematic of the hatchery design is included in Figure 1.

FISH PRODUCTION

Production for 1991 was 5,195,710 fish weighing 113,100 pounds (Table 1). Cost of fish produced averaged $1.836 per pound and $0.039 per fish (Table 2). Included in the year's production were 23 lots, comprised of 8 species and 14 different strains, as follows:

Rainbow trout
- Arlee (Mt) (3 year classes)
- Mt. Shasta (Ca) (2 year classes)
- Pennask River (BC) (2 year classes)
- Mt. Lassen (Ca)

Cutthroat trout
- Westslope (2 year classes)
- Henrys Lake

Brown trout
- Saratoga (Wy) (2 year classes)
- Spring Creek (Mt)

Rainbow **x** cutthroat trout hybrids (2 year classes)

Coho salmon

Kokanee salmon
- October (Paulina Lake, OR)
- Early (Deadwood Reservoir) (2 year classes)

Fall chinook salmon (2 year classes)

Grayling

HATCHERY IMPROVEMENTS

Bypass cleaning drains were constructed for two batteries of raceways to allow off-line settling of hatchery effluent. Waste from all outside raceways can now be settled off-line.

Four stainless steel nursery troughs were purchased for the hatchery building. A new 16-tray Heath incubator stack was added to the battery of incubators to replace one of the many worn-out stacks. Ten automatic fry feeders were purchased.

A mig-welder was purchased and used to build perforated-plate fish screens for the raceways. The furnace and wood stove in residence 1 were replaced.

FUTURE NEEDS

The furnace and wood stove in residence 3 are also near the end of their useful life.

Additional fry feeders and replacement incubators are needed for the hatchery building. As water continues to become a luxury in drought years, the cleaning drain system for the large raceways needs to be fitted with an 8-inch valve, which can stop the flow of leakage water at non-cleaning times. This will insure that water bypasses Warm Springs Creek only during cleaning.

FISH HEALTH

Generally, fish health was good this year. Lot 1-U-Id-16 (westslope cutthroat) suffered some bacterial gill disease after their transfer from the McCall Hatchery. This resulted in mortalities that were higher than normal during stocking of high mountain lakes in Region 7. Once detected, the problem was solved quickly with a benzalkonium chloride drip.

This is the second year this problem has occurred. It is probably caused by a change in water quality from McCall to Mackay. In the future, this problem will be anticipated, and these fish will be requested earlier to acclimate them to Mackay water prior to stocking the high lakes.

Under direction of the resident pathologist, all lots were fed a manufacturer's terramycin-medicated diet for 14 days, when they were 2,000/lb, as a prophylaxis against coldwater disease. Coldwater disease was not found in any lot this year.

Bacterial kidney disease was detected in early kokanee brood fish taken from Wild Buck Creek using the ELISA technique. These fish were parents to lot 1-U-Id-KE. Unfortunately, this was discovered only after eggs from that stock

had been eyed and shipped to the Ashton Hatchery. A summary of disease inspections is included in Table 3.

FISH STOCKED AND TRANSFERRED

Fingerling of various species and strains were stocked in all 7 regions of Idaho (Table 1). After an absence of several years at Mackay, brown trout were again raised for Regions 4 and 6.

Catchable rainbow trout (8+ inches) were stocked in Regions 6 and 7 and transferred to the Ashton and Sawtooth hatcheries for redistribution. Half of the 100,000 rainbow fingerling for Mackay Reservoir were held over and stocked as 8-inch fish in the late fall. The catchable transfers were not done as in past years (Table 4).

Eyed early kokanee eggs were shipped to the Ashton and Cabinet Gorge hatcheries, which is a change from previous years.

FISH SPAWNING

The run of October kokanee in Paulina Lake, Oregon was much later than normal, and numbers were down significantly from past years. No eggs were available from that source this year.

Early kokanee eggs, normally eyed at the Eagle Hatchery, were received green and eyed, shipped, and hatched at Mackay this year. Extra eggs were taken by the Nampa Hatchery staff to make up for the shortfall in October kokanee.

FISH FEED

Total feed used during the year was 123,352 pounds at a cost of $38,949.33. Feed conversion averaged 1.0906 pounds of feed per pound of fish produced. Feed cost per pound of fish produced was $0.34.

Rangen Trout & Salmon diet, Rangen Soft-moist diet, and Nelson's Sterling Silver Cup Salmon diet brands were used, depending on the nutritional needs of different strains.

A feed study comparing the performance of Rangen Trout and Salmon diet with Sterling Silver Cup Salmon diet was conducted on kokanee salmon fry by Doug Engemann. Feed quantities were calculated by Haskell's formula (% body weight = HC/L). Kokanee were split into two raceways, each with 400,000 fry. Each raceway was fed at a hatchery constant of 5.76, with densities and flows equal. Feed quantities were increased every three days.

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Sample counts were taken monthly and mortalities collected daily. While the study was conducted for 90 days, results may be drawn only from the first 30 days due to computer data entry error after the first 30-day period.

Results show that Silver Cup outperformed Rangen, with better conversion, better resulting fish condition factor, increased growth rate, and lower costs per pound of growth.

	RACEWAY L7	**RACEWAY** L8
Feed Brand	Rangen	Silver Cup
Feed Size	#2 Trout & Salmon	#2 Salmon
Ending Number	399,439	399,367
% Survival	99.9%	99.8%
Final Condition Factor C	2.756	2.969
Food Fed (lb)	729	693
Weight Gain (lb)	513	821
Feed Conversion	1.42	0.844
Feed Cost/lb feed	$0.3900	$0.3765
Feed Cost/lb fish	$0.5538	$0.3178

PUBLIC RELATIONS

Approximately 800 people toured the hatchery during the year. Due to the remote location and unfavorable climate of the hatchery, few people actually seek it out. Most are hunters and fishermen who happen here incidental to other activities.

Hatchery tours were given to two school groups. A slide presentation and question-and-answer period was conducted for the local Chamber of Commerce. An informational booth with exhibits and pamphlets was set up at Mackay Reservoir on Free Fishing Day. This was an interagency effort by Idaho Department of Fish and Game, U.S. Forest Service, Bureau of Land Management, and various local groups. The hatchery crew and the local Conservation Officer joined Idaho's "Adopt-A-Highway" litter control program.

CATCHABLE RAINBOW FIN CONDITION

Comparative observations were made of the several strains of rainbow used for catchables during the last several years. Of three strains used, Mt. Lassen rainbow have been found to have the poorest fin condition at stocking time. Mt. Shasta rainbow fare better than the Mt. Lassen's, but tend to lose fins drastically when feed is cut to slow growth. Arlee rainbow tend to provide the best looking pectoral fins at stocking, reared under variable conditions. Catchables held over for stocking in 1993 will be Arlee rainbow exclusively.

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During 1991, a quantitative measurement for fin condition was developed at the Ashton Hatchery. This method will be used in future measurements.

FISH MARKING

Catchable rainbow stocked in Antelope Creek, Iron Bog Creek, Mackay Reservoir, and the Big Lost River were jaw-tagged with reward tags. Pennask River rainbow stocked in Little Payette Lake were adipose fin-clipped. Ten percent (100,000) of the Henrys Lake cutthroat stocked in Henrys Lake were adipose fin clipped. Normal fall chinook stocked in Coeur d'Alene Lake were LV fin clipped. Heat-shocked fall chinook stocked in Coeur d'Alene Lake were LV fin and adipose fin clipped.

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ACKNOWLEDGMENTS

During 1991, the Mackay Hatchery crew included: Bill Doerr, Fish Hatchery Superintendent II; Doug Engemann, Fish Hatchery Superintendent I; Robert Hoover, Fish Culturist; Glenn McConnell and Linda Williams, Biological Aides.

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Table 1. Fish production at Mackay Fish Hatchery, January 1 to December 31, 1991.

Species & Strain	Lot number	Source	Received as	Number/pound received or carried over (*)	Yield (number/ pound)	Destination, Comments
Rainbow RA Arlee	O-En-RA	Ennis NFH, Mt.	Eyed Eggs	58,350/ 9,971*	60,164/ 30,154	Regions 6 & 7, Catchables
Rainbow RA Arlee	1-En-RA	Ennis NFH, Mt.	Eyed Eggs	160,000/ 40*	169,537/ 23,045	Mackay Reservoir Fingerling & Catchables
Rainbow RA Arlee	2-En-RA	Ennis NFH, Mt	Eyed Eggs	238,015/ eggs	200,000/ 100	1993 Catchables
Rainbow R5 Mt. Shasta	O-En-R5	Ennis NFH, Mt	Eyed Eggs	55,720/ 9,706*	59,704/ 23,685	Regions 6 & 7, Catchables
Rainbow R5 Mt. Shasta	1-En-R5	Ennis NFH, Mt	Eyed Eggs	230,076/ eggs	178,939/ 14,535	Region 6 Fingerling, 92 Catchables
Rainbow RP Pennask R.	0-F-Can	Summerland Trout Hatchery, B.C.	Eyed Eggs	10,948/ 68*	11,360/ 225	Little Payette Lake Adipose clipped, hand count.
Rainbow RP Pennask R.	1-F-Can	Summerland Trout Hatchery, B.C.	Eyed Eggs	18,228/ eggs	12,900/ 50	Little Payette Lake, 1992.
Rainbow R4 Mt. Lassen	1-Y-Ca	Mt. Lassen Trout Farm, Ca	Eyed Eggs	35,414/ eggs	24,050/ 10,6	Region 6 & 7 High Mountain Lakes.
Cutthroat C2 Westslope	0-U-Id	McCall SFH, Idaho	Fry	27,000/ 355*	26,000/ 1,400	Payette Lake Net Pen
Cutthroat C2 Westslope	1-U-Id-16	McCall SFH, Idaho	Fry	84,000/ 137	79,100/ 600	Region 7 High Mountain Lakes, Payette Lake Net Pen 1992.
Cutthroat C3 Henrys Lake	1-U-Id-C3	Henrys Lake SFH, Idaho	Eyed Eggs	1,523,787/ eggs	1,221,331/ 11,874	Region 4 & 6 High Mountain Lakes, Henrys Lake, Sublett
Brown BNT Saratoga	0-Sr	Saratoga NFH, Wy	Eyed Eggs	160,000/ 45*	162,813/ 4,187	Regions 4 & 6 Fingerling
Brown BNT Saratoga	1-Sr	Saratoga NFH, Wy	Eyed Eggs	200,000/ 50*	200,000/ 80	Regions 4 & 6 & Hagerman Hatchery, 1992
Brown BNT Spring Cr.	2-Y-Mt	Spring Creek Hatchery, Mt	Eyed Eggs	100,000/ alevins	100,000/ 25	Regions 4 & 6, 1992
Rainbow x Cutthroat Hybrids RC	1-U-Id-RC	Henrys Lake SFH Idaho	Eyed Eggs	948,418/ eggs	673,365/ 9,515	Regions 2, 3,5, 6
Rainbow x Cutthroat Hybrids RC	9-RC-HOR	Henrys Lake SFH, Idaho	Eyed Eggs	200/ 200*	160/ 320	Held for assessment of gonadal development. Methyl-testosterone sterilized.
Coho Salmon CO	2-Wd	Willard/White Salmon NFH, Wa	Eyed Eggs	31,725/ eggs	30,000/ alevins	Lake Fork Creek, as smolts September 1992
Kokanee KO Paulina L.	O-U-Or	Paulina Lake, Or	Green Eggs	557,788/ eggs	422,650/ 3,875	Regions 3, 4, 7
Kokanee KE Deadwood	0-U-Id-09	Eagle SFH, Id	Eyed Eggs	815,000/ 679*	692,550/ 9,755	Regions 2, 3, 4, 5, 6, 7

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Table 1. Continued.

Species & Strain	Lot number	Source	Received as	Number/pound received or carried over (*)	Yield (number/ pound)	Destination, Comments
Kokanee KE Deadwood	1-U-Id-	Deadwood Res., Idaho	Green Eggs	2,154,379 eggs	895,00 198	Regions 2, 3, 4, 5, 6, 7, 1992. Shipped 960,000 eyed eggs.
Fall Chinook FC Wolflodge	0-U-Id-	Sandpoint SFH, Idaho	Eyed Eggs	40,000/ 34*	41,600/ 1,650	Coeur d'Alene Lake, clip 2Z clip error, count.
Fall Chinook FC Wolflodge	0-FC-	Sandpoint SFH, Idaho	Eyed Eggs	1,400/ 2*	1,050/ 30	Coeur d'Alene Lake, shock, LV & Ad clip, count.
Fall Chinook FC Wolflodge	1-U-Id-	Sandpoint SFH, Idaho	Eyed Eggs	13,000/ alevins	13,000/ 13	Coeur d'Alene Lake, Normal Diploids.
Grayling GR Wyoming	1-U-Id-	Ashton, SFH, Idaho	Fry	10,100/ 1.17	10,000/ 6.9	Region 4, 6, 7 High Lakes

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Table 2. Production costs at Mackay Fish Hatchery, 1991.

Size (inches) Strain, Species	Total Cost	Cost/ pound	Cost/ fish
14 Arlee Rainbow	$34,637	$1.73	$0.575
11 Arlee Rainbow	39,100	1.74	0.437
5 Arlee Rainbow	1,032	1.04	0.237
14 Mt.Shasta Rainbow	**25,646**	1.83	0.429
6 Mt. Shasta Rainbow	**26,626**	1.83	0.148
4 Pennask Rainbow	412	1.83	0.036
1 Mt. Lassen Rainbow	1,019	96.13*	0.042
6 Westslope Cutthroat	2,564	1.83	0.099
2 Westslope Cutthroat	2,099	3.50*	0.026
3 Henrys Lake Cutthroat	22,751	1.91*	0.019
3 Saratoga Brown Trout	7,583	1.82	0.046
3 Rainbow x Cutthroat Hybrids	17,430	1.83	0.026
3 October Kokanee	7,098	1.83	0.167
3 Early Kokanee	**16,486**	1.81	0.238
5 Fall Chinook	3,114	1.89	0.072

*Includes cost of helicopter rental for stocking in high mountain lakes.

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Table 3. Fish health inspections at Mackay Fish Hatchery, January 1, 1991 - December 31, 1991.

Sample date	Species/Strain	Lot number	VH	VP	VE	BK	BF	BR	BC	PX	PW	PC	PI	Comments
4/16/91	Early kokanee	0-U-ID-09	-	-			-	-	-					VIRO: 0/20, 0/8 Bacty.
4/16/91	RC Hybrids	9-RC-HOR												Methyltestosterone treated fish, 14/30 with no gonadal development.
4/16/91	RC Hybrids	1-U-ID-RC	-	-										VIROLOGY: 0/45
4/16/91	Fall chinook	0-U-ID-FC	-	-		-	-	-	-			-	-	PC: 0/10, 0/12 BACTY, 0/60 BK VIRO 0/60, PW: 0/40
9/10/91	Early kokanee brood		-	-		+								Wild Buck Creek, BK (ELISA)2/31; BK (FAT) 0/31, VIRO 0/60
9/10/91	Early kokanee brood		-	-		-						-		Deadwood River, PC 0/24, BK (ELISA) 0/30 BK (FAT) 0/30, VIRO 0/30
10/23/91	Early kokanee brood					+								BK (FAT) 0/51, BK (ELISA) 10/43--9 LOW, 1 Medium OD

+ = Positive results - = Negative results
* = Testing in progress

VH = IHNV, infectious hematopoietic necrosis virus VP = IPNV, infectious pancreatic necrosis virus
VE = EIBS, erythrocytic inclusion body syndrome virus
BK = bacterial kidney disease agent, Renibacterium salmoninarum
BR = enteric red mouth bacterium, Yersinia ruckeri
BC = bacterial cold water disease, Cytophaga psychrophila or Flexibacter psychrophilus BF = bacterial furunculosis, Aeromonas salmonicida PW = PKX, agent of PKD, proliferative kidney disease PC = Ceratomyxa shasta, agent of ceratomyxosis PI = Infestation by Icthyophthirius multifilis

ELISA = enzyme-linked innumosorbent assay FAT = fluorescent antibody test (direct)

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Table 4. Fish and eggs stocked and transferred, Mackay Fish Hatchery, 1991.

Size, species & strain	Fsih stocked numbers	Fish stocked pounds	Fish transferred numbers	Fish transferred pounds	Eggs transferred numbers
11-14 inch Arlee rainbow trout	52,664	27,154	7,500	3,000	
5-8 inch Arlee rainbow trout	95,115	4,500			
10-11 inch Mt. Shasta rainbow trout	54,454	21,585	5,250	2,100	
4-7 inch Mt. Shasta rainbow trout	140,168	8,650			
4 inch Pennask River rainbow trout	11,360	225			
1 inch Mt. Lassen rainbow trout	24,050	10.6			
4 inch Saratoga brown trout	162,813	4,187			
6 inch Westslope cutthroat trout	26,000	1,400			
2 inch Westslope cutthroat trout	55,100	110			
3 inch Henrys Lake cutthroat trout	1,221,331	11,874			
3-4 inch rainbow x cutthroat hybrids	673,365	9,515			
18 inch rainbow x cutthroat hybrids	100	200			
3.5 inch October kokanee salmon	422,650	3,875			
3.5 inch early kokanee salmon	692,550	9,755			
Early kokanee eyed eggs					965,000
5 inch Wolflodge fall chinook salmon	42,650	1,680			
1.5 inch grayling	10,000	6.9			

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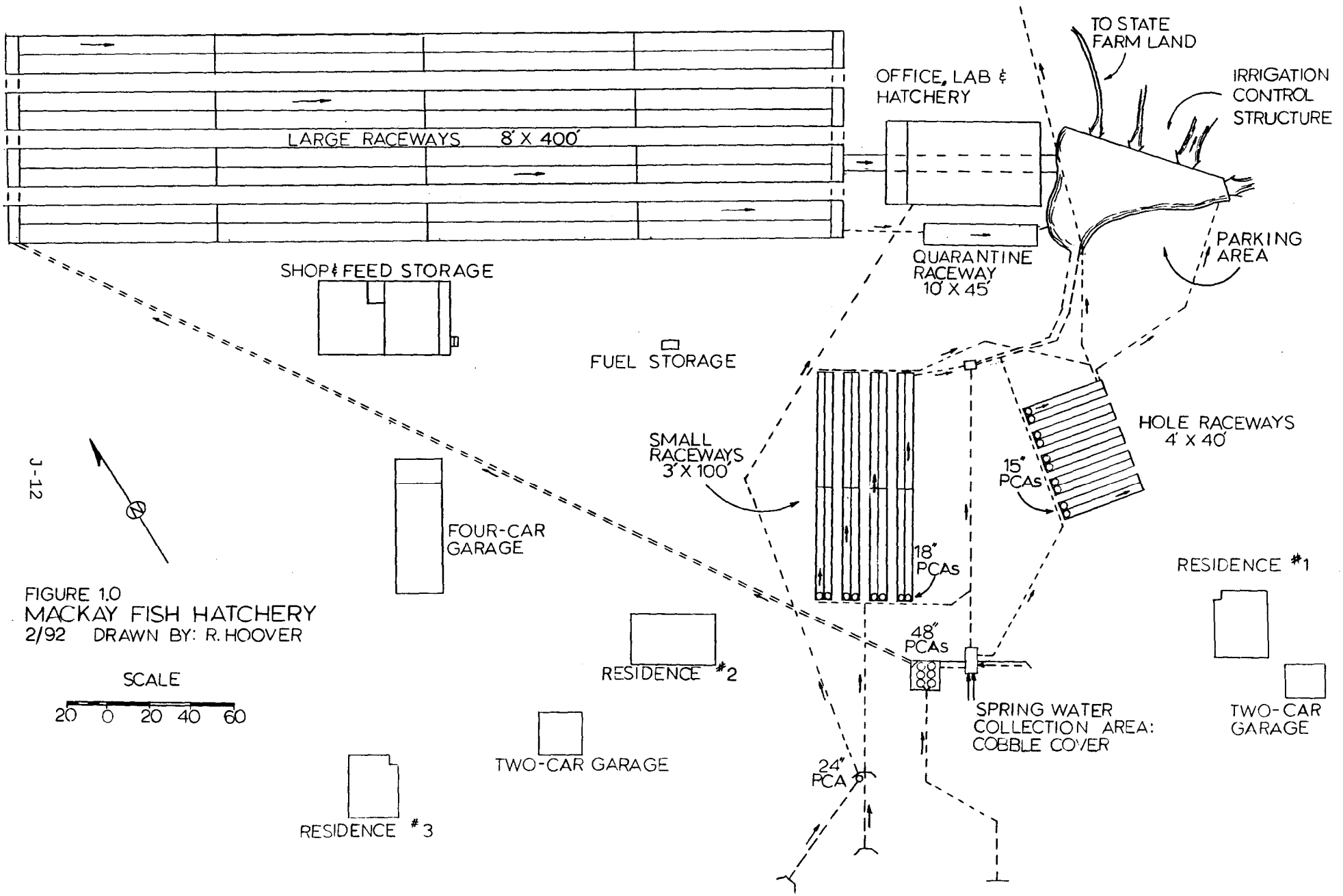

FIGURE 1.0
MACKAY FISH HATCHERY
2/92 DRAWN BY: R. HOOVER